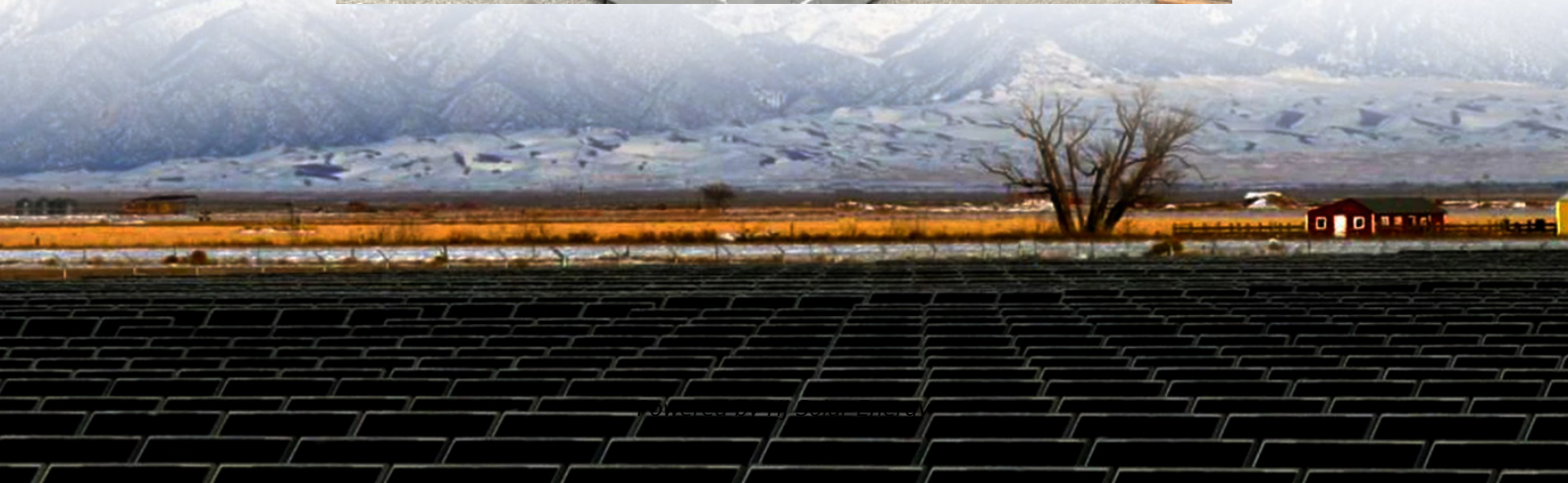


# Lithium battery chemistries enabled by solid-state electrolytes





## Overview

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What chemistries and systems are enabled by solid electrolytes?

This Review details recent advances in battery chemistries and systems enabled by solid electrolytes, including all-solid-state lithium-ion, lithium-air, lithium-sulfur and lithium-bromine batteries, as well as an aqueous battery concept with a mediator-ion solid electrolyte.

Can solid-state electrolytes be used for lithium batteries?

In the past two decades, many kinds of solid electrolytes with high ionic conductivity ( $\sigma_{\text{Li}^+} > 1 \text{ mS cm}^{-1}$ ) have been obtained and some of them even possess ultrahigh  $\text{Li}^+$  conductivities, surpassing conventional OLEs. However, the industrial-scale application of solid-state electrolytes to lithium batteries still faces great challenges.

What types of electrolytes are used in lithium ion batteries?

The solid-state electrolytes used in lithium-ion batteries belong mainly to two classes of material: lithium-ion-conductive polymers and inorganic lithium-ion-conductive ceramics.

Are lithium batteries a solid electrolyte?

Since the 2000s, solid electrolytes have been used in emerging lithium batteries with gaseous or liquid cathodes, such as lithium-air batteries 50, 51, lithium-sulfur batteries 52, 53 and lithium-bromine batteries 54, 55. Solid-electrolyte sodium-ion batteries that operate at ambient temperatures have also been demonstrated 56.

Who supported the study of lithium battery chemistries enabled by solid-state electrolytes?

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authors declare no competing interests. Manthiram, A., Yu, X. & Wang, S. Lithium battery chemistries enabled by solid-state electrolytes.

Are solid-state electrolytes a good material for next-generation batteries?

Solid-state electrolytes have been positioned as materials for the next-generation batteries. Especially, all-solid-state lithium metal batteries are promising as they can realize high-energy-density, while being safe.



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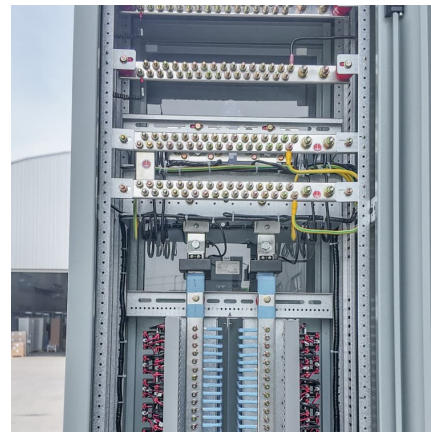


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In this Review, we provide a background overview and discuss the state of the art, ion-transport mechanisms and fundamental properties of solid-state electrolyte materials of interest for ...

### [Lithium battery chemistries enabled by solid-state ...](#)

This article provides an overview of the history, properties and applications of solid-state electrolytes for various lithium battery chemistries. It discusses the challenges and ...



### [Lithium battery chemistries enabled by solid-state ...](#)

This Review details recent advances in battery chemistries and systems enabled by solid electrolytes, including all-solid-state lithium-ion, lithium-air, lithium-sulfur and

### [Lithium battery chemistries enabled by solid-state ...](#)

We focus on recent advances in various classes of battery chemistries and systems that are enabled by solid electrolytes, including all-solid-



state lithium-ion batteries and



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This review summarizes recent, past five years, advancements in solid-state electrolyte designs, and the performance of all-solid-state batteries, and provides an outlook for ...



### Autonomous ion-highways quasi-solid electrolytes toward high ...

4 ???· Abstract Electrolyte solidification holds great promise in addressing safety concerns. Nevertheless, integrating high electrochemical stability and intrinsic interfacial compatibility ...





### Recent advances and remaining challenges of solid-state electrolytes

4 ???· Abstract All-solid-state lithium batteries (ASSLBs) have garnered significant attention as a next-generation energy storage technology, providing superior safety, enhanced stability, ...



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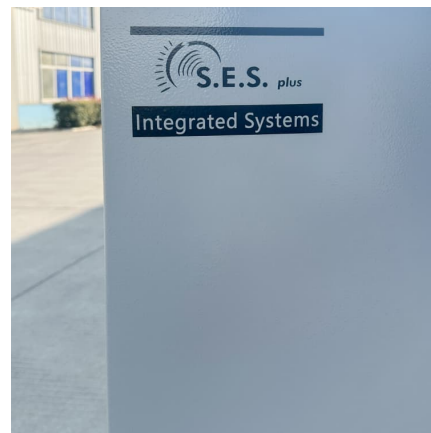
### Research Progress on Solid-State Electrolytes in Solid-State Lithium

For each kind of solid-state electrolytes, details on the preparation, properties, composition, ionic conductivity, ionic migration mechanism, and structure-activity relationship, ...



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This review covers the background, state of the art, ion-transport mechanisms and properties of solid-state electrolyte materials for energy storage applications. It also discusses recent ...

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